

Visual Impairment Screening in Cibeusi Elementary School Students

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Abstract

Background: The World Health Organization (WHO) shows that there are around 153 million people with visual impairment due to uncorrected refractive error, mostly in 8–10 years. Screening of visual function in earlier age is important, because it is treatable. Correction of refractive error by using eye-glasses is the easiest and the cheapest way. This study aimed to identify the frequency of visual impairment and eye-glasses-used in children aged eight to ten in Cibeusi Elementary School.

Methods: A descriptive study was conducted. This study was held in August 2014. Data were obtained from Cibeusi Elementary School in Jatinangor; simple random sampling technique was used to select 8–10 years old students. The total number of respondent was 101 students. Screening for visual impairment was performed using E-Chart.

Result: Eleven eyes (5.44%) from a total of 202 eyes had visual impairment. Six (5.94%) students had visual impairment, whereas only 1 (1%) student used eye-glasses for improving his visual function. Visual impairment was considerably high in boy-students aged 8 years and was most prevalence in 3rd grade students.

Conclusions: There are visual impairments which are not corrected with sunglasses.

Keywords: Children, corrected refractive error, eye-glasses-used, visual impairment screening

Introduction

Visual impairment is one of the health problems which has a long-term effect and has not been solved completely by the government and health care providers. Based on the World Health Organization (WHO) in 2006, 153 million people had visual impairment due to uncorrected refractive error. Thirteen million of them were 5–15 years old.¹ Based on Basic Health Research (*Riset Kesehatan Dasar*, *Riskesdas*) in 2013, the prevalence of visual impairment in ≥ 6 years old was 0.9% in Indonesia. Lampung had the highest prevalence of visual impairment (1.7%), on the other hand, the lowest prevalence was in Yogyakarta (0.3%). In West Java, the prevalence of visual impairment was 0.8%.² A study conducted in Nigeria shows that in the 5–15 years old age group, 8–10 years old (40.7%) children had the greatest number of visual impairment.³

Uncorrected refractive error causes visual impairment, affects communication and

learning, loss of productivity causing poverty and even quality of life.⁴ Correction of refractive error by using eye-glasses is the easiest and the cheapest way than using contact lenses or performing an operation. It should be easily accessed by the community. In fact, there are limitations for performing that strategy especially in developing countries which are lack of infrastructure of eye-glasses providers, lack of training for eye-care givers, and lack of education for both parents and teachers about the importance of doing correction of refractive error. India was one of the countries that have conducted the eye examination for school-children and provided eye-glasses for children who have visual impairment as the way to decrease the number of avoidable blindness.^{1,5,6}

Furthermore, to find out whether school-aged children have visual impairment or not, the visual function screening program is held to support Vision 2020 by WHO.¹ The awareness of parents, teachers, and community to avoid blindness in their children especially caused by refractive error is poor. Since refractive

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error does not show specific symptoms, this screening program is important to be carried out.^{1,6} Training for teachers to screen visual function in school should be developed to detect visual impairment in early age. This study aimed to recognize the frequency of visual impairment and eye-glasses-used in students aged 8–10 years at Cibeusi Elementary School in Jatinangor, in 2014.

Methods

This descriptive study was conducted at Cibeusi Elementary School Jatinangor in August 2014 and. This study was approved by the Health Research Ethic Committee Faculty of Medicine, Universitas Padjadjaran.

Students aged 8–10 years were selected by using simple random sampling, and 101 students met the inclusion criteria. The age of the 8–10 years students were calculated from their last birthday to the date of examination held. The students were permitted by their parents to be involved in this study after signing informed consent letter. On the other hand, students who were having a red eye were excluded from this study.

The researcher did the visual impairment screening by using the E-Chart on a distance

of 3m; each eye separated starting from the right eye. Students with eye-glasses still used eye-glasses when screening was performed. Students had to adjust four large E-letters and four small E-letters with different directions. Those who were able to adjust at least three small E-letters were categorized as having normal eyes. While those who were able to adjust two or less small E-letters were categorized as having visual impairment. Data obtained in this study were input to Statistics Software.

Moreover, this study was conducted based on ethical aspects. This study may benefit to screen visual impairment, so both parents and teachers could give interventions, for example correction by using eye-glasses. Additionally, this study did not harm the students and they were all treated with similar manners. The involvement of the students in this study was voluntary.

Results

A total of 101 students consisting of 49 (48.5%) boys and 52 (51.5%) girls were included in this study. Students were of 3rd to 5th grade. Those who were 8 years old (39.6%) were the most common in this study. Only 1 (1%) student

Table 1 Clinical Eye Examination Based on Student's Characteristics

Characteristic	n (%)	Eye Examination	
		Normal n(%)	Visual Impairment n(%)
Gender			
Boys	49 (48.5)	87 (43.1)	11 (5.4)
Girls	52 (51.5)	104 (51.5)	0 (0)
Age (years old)			
8	40 (39.6)	74 (36.6)	6 (3.0)
9	38 (37.6)	72 (35.6)	4 (2.0)
10	23 (22.8)	45 (22.3)	1 (0.5)
Grade			
3rd	47 (46.5)	86 (42.6)	8 (3.9)
4th	29 (28.7)	55 (27.2)	3 (1.5)
5th	25 (24.8)	50 (24.8)	0 (0)
Eyeglasses-used			
Yes	1 (1%)		
No	100 (99%)		
Total	101 (100.0)	191 (94.6)	11 (5.4)

Table 2 Clinical Eye Examination

Characteristic	Right Eye n (%)	Left Eye n (%)
Eye Examination		
Normal	95 (94.1)	96 (95.0)
Visual Impairment	6 (5.9)	5 (5.0)
Total	101 (100)	101 (100)

already used eye-glasses during screening.

By using E Chart as a screening tool, out of a total of 202 eyes, 191 (94.55%) eyes had normal visual function whereas 11 (5.44%) eyes had visual impairment. The data showed that boys (5.94%) had greater number of visual impairment than girls. Students with visual impairment were considerable high in 8 years old students (3.0%) and were of 3rd grade (3.9%). Frequency of students with visual impairment was not similar with frequency of eye-glasses-used students (Table 1).

Results of clinical eye examinations showed that there were small differences of right and left eye with visual impairment. Five students had visual impairment in their both eyes and one student had one eye with visual impairment (Table 2).

Discussion

Eye examination in infant and children is conducted by eye-care providers in the Eye hospital by using pictures, and one of them is E-Chart. It is similar with the tool used in this study to screen visual impairment. E-chart is used to assess the visual function in four years old and older verbal children.^{2,7} Prevalence of school-aged children in the age group 6-14 years with visual impairment is 0.03% in a study conducted by Riskesdas 2013. The study by Teerawattananon et al.⁸ in Thailand (2014) has showed that 6.6% students have visual impairment. An other study held in Ethiopia by Sewunet et al.⁹ shows that 11.6% school-aged children have visual impairment. In this study the frequency of visual impairment among students was 5.94%. The variations of result in several studies can be due to different sampling technique methods, size of population screened, and geographical area.¹⁰

Furthermore, boys (5.94%) with visual impairment were in greater number than girls (Table 1). This is similar with the study conducted by Opubiri et al.³ in Nigeria (2013), which shows visual impairment is the most common problem in age group 8-10 years ,

and 7 from 11 children were boys. In contrast, a study conducted in Saudi Arabia proves that refractive error occurs more in girls (12%) than boys (7.7%).^{10,11} While a study conducted by Teerawattananon et al.⁸ in Thailand (2014) has concluded that there is no significant difference of occurrence of visual impairment in boys (51%) and girls (49%). There is no difference of eye development both in pre-school-age and school-age children based on their gender.⁷

According to WHO that proved that most children affected by visual impairment due to refractive error were in age group 5–15 years, this study focused on students aged 8–10 years. Moreover, 8 years old students had the greatest number of visual impairment and students were of 3rd grade (Table 1). This data is similar with a study conducted in Saudi Arabia¹¹ which shows visual impairment is most common in students aged 7–8 years and were of 3rd to 4th grade. One of the reason is students are actively growing in that age group.¹¹ The study conducted by Opubiri et al.³ in Nigeria (2013) also shows that visual impairment is considerably high in age group 8–10 years (40.7%). A study in Thailand⁸ (2014) reports that screening program has already been conducted in pre-school and primary elementary school children. The teachers get difficulties during the screening process that is performed in pre-school children, due to lack of cooperative and lack of knowledge of the children.⁸ Eye examination in early age needs parents participation to get children focus while doing the examination.⁷ So that children aged 8-10 years old were involved in this study.

The alteration of eye diameter and its curvature affects the clearance of image captured by the retina. The changes of axial length occur faster in the first three years of life, after that the changes occur slowly. In the second decade of life, the cornea will be flattened, keratinocyte will be thinner, and the endothelial cell will be changed. Lens crystalline affecting lens capability in refraction also changes in the second decade of life. Lens fiber will be produced along the

life, so it becomes thicker in older age.⁷

Moreover, data showed 1 (1%) student used eye-glasses during screening, in contrast to 6 students with visual impairment (Table 1). The study conducted by Riskesdas Indonesia in 2013 in age group 6-14 years, shows that there are 1% cases of corrected refractive error.² The study conducted in 2012 by Ghosh et al.¹² in Kolkata, India, shows that 4 (1.46%) students from the total of 273 students with visual impairment already used eye glasses. Three other studies conducted in Saudi Arabia¹¹ that have a similar purpose with this study shows three different results. First, from 18.6% students with refractive error, 16.3% students have uncorrected refractive error.¹¹ Second, in 2012, according to a study conducted by Al Wadaani et al.¹⁰ in Al Hassa, Saudi Arabia, 9.4% students with refractive error have used eye-glasses to avoid early blindness. Data in the study of compliance of eye-glasses-used in primary school children by Aldebasi¹³ shows that boys (30.87%) have poor compliance than girls (35.97%). Another study conducted in Ethiopia⁹ reports that 9.3% students with refractive error have used eye-glasses. There are several factors affecting the differences in number of eye-glasses-used in students with visual impairment. It depends on the education level and the age of people.² Besides, there is underestimation from the eye care provider in health care facilities and policy maker in the government about the importance of using eye-glasses for visual impaired children. The other factor is people of low socioeconomic level have difficulties in getting health care facilities from the eye care provider.¹⁴

This study concludes that frequency of visual impairment and eye-glasses-used students at Cibeusi Elementary School is considerably different. There are some limitations in this study. E-chart used as a tool in screening of visual impairment does not give information about the visual acuity. This screening program provides information whether the students has visual impairment or not. Data were obtained during school time so that the number of students involved in this study was limited. There is no analysis about factors affecting visual impairment in aged 8-10 years.

The frequency of visual impairment was not similar with the frequency of eye-glasses-used in this study, so there should be an approach not only to the Health and education department but also to both teachers and parents to make visual screening as a school program to support Vision 2020 of WHO. It

may also decrease the number of avoidable blindness in early age. Education is important to increase the awareness of teachers and parents that visual impairment can affect learning, communication, productivity, and quality of life. Next study should be conducted to analyze whether there is an association of student's characteristics and visual impairment or not, and factors affecting visual impairment.

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